

Reservoir Cathode for Electric Space Propulsion, Phase I

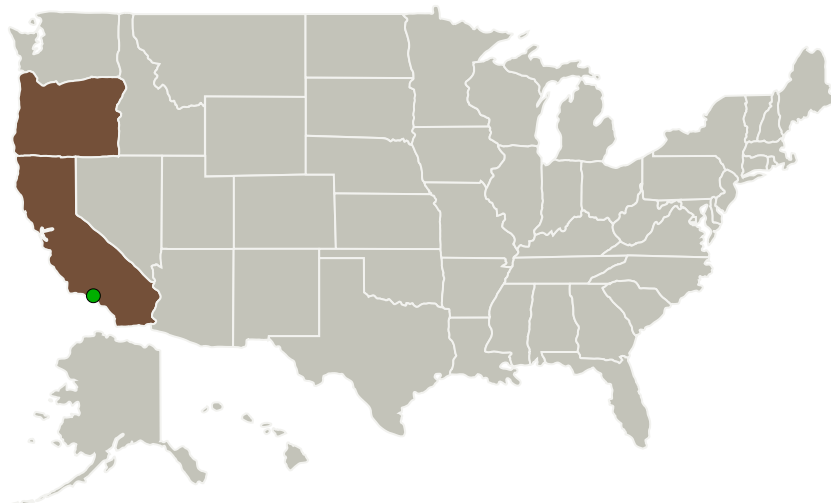
Completed Technology Project (2011 - 2011)



Project Introduction

We propose a reservoir cathode to improve performance in both ion and Hall-effect thrusters. We propose to adapt our existing reservoir cathode technology to this purpose. Reservoir cathodes are the only emission sources that are capable of providing the necessary current density ($>5.0 \text{ A/cm}^2$) and life ($>100,000$ hours) for next generation high-power thrusters. More powerful thrusters are needed for interplanetary and lunar missions, including earth escape and near-earth space maneuvers. Reservoir cathodes are able to provide sufficient new barium to the cathode surface to overcome the high barium removal rates in ion engines. We have many years' experience developing reservoir cathodes. The key challenge is the stresses exerted on the cathode tube due to differential expansion and large temperature excursions. These lead to fracturing and weld failure. Our innovation solves this problem. In Phase I, a prototype is built and tested. In Phase II, we optimize for specific ion engines.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
e-beam, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Beaverton, Oregon
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Oregon
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Project Transitions

**February 2011:** Project Start**September 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140226>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

e-beam, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Bernard K Vancil

Co-Investigator:

Bernard Vancil

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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.2 Electrostatic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System